



# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AIC-024-PCT2		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/013630		International filing date (day/month/year) 01.12.2004	Priority date (day/month/year) 01.12.2003	
International Patent Classification (IPC) or national classification and IPC G10L19/02				
Applicant AIC et al				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 10 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 11 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input checked="" type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  03.10.2005		Date of completion of this report  07.03.2006		
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Dobler, E  Telephone No. +49 89 2399-6048  		

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

**10/581141**  
International application No.  
PCT/EP2004/013630

**AP20 Rec'd PCT/PTO 31 MAY 2006**

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-27, 30-41 as originally filed  
28, 29 received on 03.10.2005 with letter of 03.10.2005

**Claims, Numbers**

1-26 received on 03.10.2005 with letter of 03.10.2005

**Drawings, Sheets**

1/13-13/13 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/013630

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**Box No. II Priority**

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1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
  - ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:
- see separate sheet**

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-26
	No: Claims	-
Inventive step (IS)	Yes: Claims	3,5-12
	No: Claims	1-2,4,13-26
Industrial applicability (IA)	Yes: Claims	1-26
	No: Claims	-

2. Citations and explanations (Rule 70.7):

**see separate sheet**

INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)

10/581141

International application No.

PCT/EP2004/013630

1AP20 Rec'd PCT/PTO 31 MAY 2006

- 1 Reference is made to the following documents (D1-D4):

D1: WO95/30983 (George, Smith)

D2: David P A M-S; Szczupak J: Refining the digital spectrum. IEEE 39th Midwest symposium on Circuits and Systems, Ames, IA, USA 18-21 Aug. 1996. Vol. 2, pages 767-770. New York, NY, USA, IEEE, US, XP010222730.

D3: Wim D'haes: A highly optimized nonlinear least squares technique for sinusoidal analysis: From  $O(K^2N)$  to  $O(N \log(N))$ . Preprint on the 116th Audio Engineering Society (AES) Convention, 8-11 May 2004, Berlin, Germany, pages 1-12.

D4: Mength: "The discrete Fourier Transform". Handout at Stanford University, 09-02-2003. XP2275706.

2 PRIORITY

The International Search Report contains a P-document (D3), consequently the validity of the right to priority should be examined (see the PCT Guidelines, 6.06 (I)). Priority is claimed to the document BEW0300207 (further referred to as the *priority document*).

The right to priority is valid for claims 1,2 and 4 only, for the following reasons:

- 2.1 The present application discloses "a nonstationary nonharmonic model", which is not disclosed by the priority document (*renders the priority invalid for claims 3, 5 and all claims dependent thereon*)
- 2.2 The present application discloses that "the parameter  $\lambda_1$  allows to switch between different optimization methods and the parameter  $\lambda_2$  regularizes the system matrix", which is not disclosed by the priority document (*renders the priority invalid for claims 8-9 and all claims dependent thereon*)
- 2.3 The present application discloses "a step of computing instantaneous frequencies and instantaneous amplitudes", which is not disclosed by the priority document (*renders the priority invalid for claim 11 and all claims dependent thereon*)
- 2.4 The present application discloses "a step of computing damping factor", which is not

disclosed by the priority document (*renders the priority invalid for claim 12 and all claims dependent thereon*)

- 2.5 It should be noted that the right for priority is valid for the *subject-matter* of claims 6,7,10,13,14-26 as long as they are dependent on any of claims 1,2 or 4 only, but not for claims 6,7,10,13,14-26 as such (since they are also dependent on claims for which priority is not valid).

### 3 CLARITY

The application does not meet the requirements of Article 6 PCT, because claims 2-9, 13 are not clear.

- 3.1 Claims ~~2,3,5,7~~ lack the definition of  $w_n$ , therefore causing lack of clarity. This problem could be remedied by defining  $w_n$  as the window of claim 1 (*based on description page 2, line 5*)
- 3.2 Claim 6 claims "determining the number of relevant diagonal bands D". However, it is not clear where these diagonal bands can be found. This problem could be remedied by including the subject-matter on description *page 35, lines 11 to 12*.
- 3.3 Claims 8-9 lack the definition of the "residual spectrum  $R_m$ ", therefore causing lack of clarity. This problem could be remedied by including the subject-matter on description *page 17, line 22*.
- 3.4 Claim 13 lacks the definition of  $N'$  and  $w_{M'}^{N'}$ , therefore causing lack of clarity. This problem could be remedied by including the subject-matter on description *page 33, lines 22 to 25*.
- 3.5 The terms *close* and *relevant* used in claim 6 are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

- 3.6. Some of the dependent claims contain features which are not present in every claim on which they are based, therefore causing lack of clarity. The problematic claims are:

Claim 4 when dependent on claim 1, referring to "the stationary nonharmonic model" and to the "harmonic model".

Claim 7 when dependent on claim 1, referring to "the stationary complex amplitudes".

Claim 8 when dependent on claim 1, referring to "the stationary nonharmonic model".

Claim 9 when dependent on claim 1, referring to "harmonic signal model".

These problems could be remedied by removing references to claims which do not contain the claimed feature.

- 3.7. Throughout the set of the claims references are made to equations in the description. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here (since the claims contain the equations as well).

It is suggested that the references to equations be deleted or be put into parentheses.

- 3.8. Despite the clarity problems mentioned in 3.1-3.7, an examination has been carried out in the sense of the above considered corrections.

- 4.1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

"A method for modelling, analyzing and/or synthesizing, a windowed signal (*page 4, lines 15-23; page 10, lines 30-31 in D1*),

by computing the frequencies and complex amplitudes from the signal using a nonlinear least squares method" (*page 10, line 3 - page 12, line 10 in D1*)

Document D1 also discloses the problem that sinusoidal modelling is computationally expensive (*page 3, line 35 - page 4, line 11 in D1*).

The problem to be solved with regard to D1 can therefore be formulated as to make the calculation of the model parameters computationally less expensive.

The skilled person desiring to solve this problem would search further in the prior art and he would find document D2. D2 discloses:

"the computational complexity is reduced by taking into account the bandlimited property of the window." (*page 770, right-hand column, lines 15-24 in D2*)

The skilled person would combine the documents D1 and D2 since both deal with the parameter estimation of a sinusoidal model, therefore obtaining the subject-matter of present claim 1 in an obvious way, which therefore does not involve an inventive step, hence does not meet the criteria of Art. 33(3) PCT.

In his letter of reply dated 3.10.2005, the Applicant argues that the application "allows the computation of all amplitudes simultaneously" by "solving Eq. (19) by an adapted gaussian elimination routine", which features are not present in D1 nor in D2.

However, these features are also not present in claim 1. Therefore, they cannot be taken into account when examining novelty or inventive activity in claim 1.

The examiner would like to point out that, for example, the subject-matter of equation (19) is claimed by present dependent claim 7, not by present independent claim 1.

- 4.2 Dependent claims 2,4,13 do not contain any features which, in combination with claim 1 (claims 2 and 13) or in combination with claim 2 (claim 4) to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

D1 discloses:

[claim 2]: "a stationary nonharmonic signal model according to Equ. (2)" (*page 9, equation (10) in D1*)

D2 discloses: